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A Genealogy of Epistemic and Technological Determinism in Development Aid Discourses

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Abstract

In the last decade or so, the major development agencies have explicitly turned the spotlights on 'knowledge for development', 'ICT for development', or the 'knowledge economy' as new panacea to prompt development. This article argues, first, that knowledge and technology have *always* been integrally part of the very idea of 'development' since its emergence during Enlightenment. Recent appeals to knowledge or technology for development should be placed in an age-long genealogy of similar rationales. Second, the article elucidates that discourses about the roles of knowledge and technology in development have *always* varied widely, with deterministic and less deterministic interpretations often existing along each other. In this article, the many different interpretations are unravelled. Even today, very opposing roles are ascribed to knowledge and technology in development. Whereas strong versions of technological and epistemic determinism still reverberate in some present-day development discourses, they are simultaneously countered by discourses focusing on 'capacity building'.

Keywords : development studies: historical views, technological determinism, epistemic determinism, knowledge for development, ICT4D, capacity building

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1 Introduction

Point four of president Harry Truman's inaugural address, pronounced on 20 January 1949 in front of the US congress, has been quoted by many scholars, to the point of weariness, as emblematic mile stone or even starting point of international development cooperation. Let me highlight one passage of the speech:

> "We must embark on a bold new program for making the benefits of our scientific advances and industrial progress available for the improvement and growth of underdeveloped areas. [...] For the first time in history, humanity possesses the knowledge and skill to relieve suffering of these people." (Truman, 1949)

Nearly half a century later the World Bank published the 1998/1999 World Development Report, entitled *Knowledge for Development*. The report opened with this statement:

> "Knowledge is like light. Weightless and intangible, it can easily travel the world, enlightening the lives of people everywhere. Yet billions of people still live in the darkness of poverty – unnecessarily. [...] Poor countries –and poor people– differ from rich ones not only because they have less capital but because they have less knowledge. Knowledge is often costly to create, and that is why much of it is created in industrial countries. But developing countries can acquire knowledge overseas as well as create their own at home." (WORLD BANK, 1998)

The similarity between the two statements, although half a century lies in between, is striking. Both quotes, however, evoke similar questions. Which knowledge or technology will reduce poverty or lead to development? Is Western knowledge apt for that? Can Western knowledge and technology be transferred to non-Western contexts? How to do that? How to stimulate domestic knowledge generation? These are some of the questions that have pervaded development discourses over more than half a century.

Closely related to the practical questions of knowledge and technology transfer, are ethical and socio-political concerns. It has since long been denounced that the hegemony of the West is partly reproduced through a continued cognitive or epistemic 'colonialism'. The West is said to establish the criteria for what counts as 'valuable knowledge' and what not, while obviously the West itself is the major producer of such knowledge (Escobar, 1995). Recent appeals to 'knowledge for development' have stirred up again the discussion about the hegemonic character of Western knowledge in development (Mehta, 2001; Stone, 2003; Többe Gonalves, 2006, among others).

The present article does not enter into this post-developmentalist debate about presumed Western cognitive hegemony, nor does it propose yet another theory on how to make knowledge in development aid work. Instead, the article examines the *idea* that 'development' and 'development aid' have to do with 'knowledge' and 'technology'. The article wants to give an overview of –and disentangle– the many different roles that have been *allotted* to knowledge in development cooperation, in an attempt to show the often conflicting polisemy.

I advance the two main conclusions of the article. First, I maintain that recent appeals to 'knowledge for development', 'ICT for development', or stimu-

lating the 'knowledge economy' in developing countries, are not original at all. By means of a brief genealogy, I will demonstrate that knowledge and technology have *always* been integrally part of the very idea of 'development', since the emergence of this Western concept during Enlightenment. The entire history of 'development cooperation' is characterised by the long struggle of trying to find the right role for knowledge and technology in development.

Second, I want to point out that discourses about the roles of knowledge and technology in development have *always* varied widely, with deterministic and less deterministic interpretations often existing along each other.

Before sketching the genealogy, I will first introduce a unifying theoretical framework for knowledge and technology, so that I can treat knowledge and technology (K&T) as two components of a larger whole. I will also introduce the concept 'technological determinism' and extend it to 'epistemic determinism'. I will relate them to the concept 'technology transfer'. The third section of the article sketches the genealogy. The fourth part discusses the competing interpretations of K&T in development discourses and re-emphasises the need to situate them in the wide, historical perspective I will have sketched throughout the article.

2 Technological and epistemic determinism

Technological determinism In modernised societies, technologies and technological artefacts are rapidly changing the ways of communicating, socialising, working, travelling,... and people have grown accustomed to this apparent power of advancing technology. To them, the steady growth of technology may appear as simply a characteristic of modern society (Marx and Smith, 1994, p. ix). The ideology that technological advances would be the main *driver* of social change is called 'technological determinism'. Actually, scholars have determined that full-blown, or 'nomological', technological determinism is composed of two different but complementary ideas (Bimber, 1994; Kline, 2001; Wyatt, 2008). The first idea is that technology would evolve independently from society, following its own inherent, unilinear, incremental logic. The second idea is that this technological change would drive –or *determine*– social change.

The technological determinism ideology is omnipresent in daily life, popular narratives and even scholarly literature. Advertisers invoke it to make you believe that their technological novelty will change our life. It is conveyed in popular narratives, telling us that "the discovery of penicillin gave us high life expectancy". Karl Marx flirted with technological determinism when he famously claimed that "the hand-mill gives you society with the feudal lord; the steam-mill society with the industrial capitalist" (Marx, 1920). Technological determinism also reverberates in many political and development discourses:

> "the Information Revolution, and particularly the phenomenon of the Internet [...] is *leading* the process of globalisation: wounding those who dont quickly enough grasp how to use it [...] but providing unprecedented benefits for those with the courage and willingness to grasp its potential to *drive change* [...] ICT is *transforming everything it touches*, from politics, to business, to culture, to education and to health." (UNDP address in Tokyo, 2000, cited in Wilson, 2002, emphases are mine)

Despite this apparent omnipresence, historians and sociologists of science and technology have convincingly demonstrated that technological determinism is wrong to a large extent (for an overview, see Bijker, 1995; Oudshoorn and Pinch, 2008). The ideology has been described as "intellectually poor and politically debilitating" (Bijker, 2010). Indeed, there does not exist a unidirectional causal link between technological change and social change –as technogical determinism suggests– nor does technology develop along its own inherent goal-directed path. Technological change does not come from major breakthroughs or giant discontinuities that diffuse throughout society, as Schumpeter represented it (1934). Rather, technological change is a continuous stream of innumerable minor adjustments, recombinations or reinterpretations of existing technologies; it happens through of a complex network of actors, user groups and governmental bodies; it is stimulated and modified by market demands and political concerns. Neither does a technology, once introduced in society, take on a life on its own. The computer, as we know it today, has evolved over more than a century and is profoundly shaped by its uses and by its users.

Summarising, society and technology co-evolve in an intimate way: technology is socially (and politically) constructed while society (including politics) is technically built (Bijker, 2010). Recent theoretical models of the technology-society interaction, such as the Social Construction of Technology (Pinch and Bijker, 1984), Actor-Network Theory (Callon and Law, 1982; Callon, 1986; Latour, 1987) or the Transformational Model of Technical Activity (Lawson, 2007), manage to navigate between the Scylla of pure technological determinism and the Charybdis of pure social constructionism.

Technology transfer So, if technology intimately evolves with society, and technological change does not produce social change in an unequivocal way, then, the *transfer* of technology from one social context –say, the Western world– to a completely different social context –say, a country in the Global South– in order to prompt some kind of social change –say, 'development'– is also very problematic. Again, two subideas underlie the technology transfer ideology. First, it supposes that technology can be detached from its social context and can be re-implemented without much trouble in a new context. Second, it seems to believe that a technology, implemented in the new social context, will recreate the same social and economic configurations (e.g. 'economic development') as in the original social context. Obviously, both affirmations are false. Transfer of technology has been criticised for ideological, epistemological and organisational reasons.

Visvanathan (2001) reminds us that the first serious, ideological criticisms to the transfer of technology came from the developing world. The Dependency School (also treated below), for instance, denounced that the underdeveloped or 'peripheral' countries of the world were presented as passive recipients of technology from the 'center' and that, as a result, industrialisation was a process over which the 'recipients' were denied control. Moreover, Visvanathan also points to the pernicious effects of inappropriate technology transfer, causing more refugees in the developing world than war does (Visvanathan, 2001).

Epistemological criticisms emphasise that there is more to technology than only the technological artefact. Nathan Rosenberg, already in 1970, contended that technology transfer for the development of poor countries is problematic.

He elicited, using historical material from the nineteenth century, that even the transfer of industrial technology from the UK to the United States –considered to have very similar socio-cultural contexts– proved to be difficult and that it relied almost exclusively "upon the transfer of skilled personnel" and on-the-job learning rather than the transfer of technological artefacts (Rosenberg, 1970). In fact, a technological artefact is surrounded by what Polanyi (1966) called 'tacit knowledge', and what contemporary psychology calls 'implicit knowledge'. It refers to the "acquisition of knowledge that takes place largely independently of conscious attempts to learn and largely in the absence of explicit knowledge about what was acquired" (Reber, 1993, p.5).

A complete model of what composes technology, is given by Dosi and Grazzi (2010). They define technology as a "human-constructed means for achieving a particular end". Their model of technology (figure 1) includes four components: (i) the procedures or recipes to achieve the desired ends, (ii) the technological artefacts involved in these procedures, (iii) physical inputs to yield the desired outcomes, and (iv) particular bits of knowledge. All four composing elements of a technology are socially embedded and shaped.

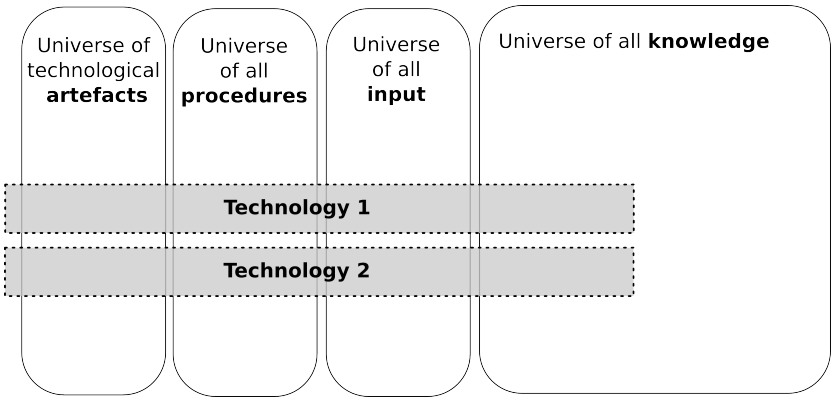

Figure 1: The components of technology, based on Dosi and Grazzi (2010).

I also mention the efforts of organisational and managerial sciences to critically analyse technology transfer. These scholars, too, emphasise that various knowledge 'barriers' hamper any technology transfer (e.g. Argyris and Schön, 1978; Carlile, 2004). Barriers are always there: they exist between two persons, between different departments within the same organisation, between different organisations, between nations or between cultures. Depending on the amount and type of knowledge that is present at both sides of the barrier, the transfer of knowledge or technology will be more or less difficult (Carlile, 2004). Plain transfer is only possible if, and only if, both sides share enough common knowledge, both sides know the differences in their knowledge, and have sufficient access to the domain-specific knowledge of the other side. In the case that the novelty of the situation is too great, the knowledge of both sides needs to be 'translated' before new, common knowledge can be created. The most difficult problem appears when the novelty of the situation produces different (political) interests for both sides. In this case, the creation of common knowledge is a matter of re-negotiating common (political) interests.

Epistemic determinism I have introduced the concept of technological determinism and explained that it is highly contested by historians and sociologists of technology. Technology and society co-evolve in an intimate way. As a result, the transfer of technology from one social context to a completely different one is highly problematic, since all elements composing a technology, including the bits of knowledge related to it, are socially embedded.

Social scientists emphasise that *all* knowledge, even scientific knowledge, is partial and embedded in a social context. This idea was already present in the work of Nietzsche who rejected the possibility of a non-perspectival knowing subject. Instead, he maintains that:

> "There is only a perspective seeing, only a perspective 'knowing'; and the more affects we allow to speak about one thing, the more eyes, different eyes, we can use to observe one thing, the more complete will our 'concept' of this thing, our 'objectivity', be." (Nietzche, 1887, p.119)

The same idea was supported by George Herbert Mead's work on perspectives (Mead, 1927), by the Harvard sociologists and their symbolic interactionism, and by Bourdieu and his concepts 'habitus' and 'doxa' (Bourdieu, 1980). After the post-modern turn, Donna Haraway's concept of 'situated knowledge' has found most resonance (Haraway, 1988). All knowledge, even our best scientific knowledge of the natural world, is conditioned by the partiality of its material, technical, social, semiotic and embodied means of reproduction.

From Dosi and Grassi's model of technology (2010) we can intuitively understand that technological knowledge is largely embedded in the social context. The claim that even scientific knowledge is situated, might appear more controversial, but it follows the same logic of situated knowledge. The fact is this: science is not a disembodied, timeless entity, but it is a practice that is incarnated in human beings (Turnbull, 2002). In fact, scientists are human beings with a specific background, pertain to a limited social class, hold particular values about their life and their profession, and are tied together in particular social communities. These people decide on how the world *is*. "Of course, they typically do this based on as much evidence as they can generate. But, in the end, people decide; the world does not. [...] The worth of knowledge is decided in communities" (Yearly, 2005, p.110-111). This conclusion is valid for all knowledge production — scientific or not.

As a result, claims of universality are now considered naive at best, but more often they are deconstructed by social scientists as hegemonic strategies that seek to overrule other perspectives (Foucault, 1980; Thompson, 2001). When a piece of knowledge is claimed to be universal, objective and accumulative, this is not because they are inherent characteristics of the knowledge itself, but because they are rather produced by the collective work of a community. Standardisation and homogenisation are typical techniques for rendering knowledge universal and hegemonic (Turnbull, 2002).

In analogy with technological determinism, I define 'epistemic determinism' the two-headed ideology that (i) knowledge is an immaterial good that is independent from the social context, and (ii), that this immaterial good can be transferred, without much effort, to another social reality where it will have similar meanings and effects as in the original social reality.

Summarising, technological determinism does not acknowledge that technology and society co-evolve, while epistemic determinism does not recognise that all knowledge is situated.

Following the model of Dosi and Grazzi (2010), I will from now on treat knowledge and technology as two closely related concepts: K&T. The same is true for the transfer of technology and the transfer of knowledge.

Methodological relativism Saying that knowledge is 'situated' or 'socially embedded', or that technology is 'socially constructed', does not imply *cognitive relativism*. The literature on situated knowledge is as hostile to relativism as to realism (Thompson, 2001). Instead, scholars in the sociology of science and technology defend a stance of *methodological* relativism. Their analysis does not judge which knowledge is true and which is not, nor which technology is the most adequate. They take a neutral stance and only analyse why certain technologies work in a specific social context and others not. They argue, for instance, that an artefact's 'success' or 'failure' or its technical 'working' or 'non-working' are subject to social variables and are not intrinsic properties of the technological artefacts themselves (Bijker, 2010).

Neither is this article a plea against the transfer of K&T in development cooperation. It does, however, plea against epistemic and technological determinism in the development discourses. If we want to give a role to K&T in development, we need to understand and take into account their social embeddedness.

Let me summarise this section about epistemic and technological determinism by applying Dosi and Grazzi's model of technology to an example: the example of a high-yielding rice seed, produced in the laboratories of a multinational biotechnology concern. A US farmer will use the seed –the technological artefact– to a certain *means*: he will want to sell the harvest. He has some *knowledge* on how to use the seed, when and how to plant, the amount of fertiliser needed. He needs knowledge about the weather, the seasons, and the particularities of the soil at his farm. The *procedures* to use the technological artefacts include: buying the seed, planting, curing, irrigating, using fertiliser, harvesting, selling the harvest,... His *inputs* are mainly capital. This farmer has certain established channels through which he might influence agricultural policies in the US and eventually the company that designed the seeds.

The same artefact (the seeds), used by a subsistence farmer in Mali, probably serves a different goal and is surrounded by different technological knowledge, different procedures and different input. This Malian farmer probably sells only a minor part of his harvest, since his main *goal* is subsistence. His *procedures* to obtain the seeds, the fertilisers and irrigation water are completely different than those of the US farmer. His view on ecology, on the performance of the soil, the variability of weather and seasons is probably very different than those of the US farmer. His political relations with fellow farmers and his government are very different, as are the channels through which he might influence the design of the seeds by the multinational company —they are probably non-existent. He relies mostly on labour as *input*, rather than capital. In short, the package of technological *knowledge*, *procedures* and *input* that surrounds the technological *artefact* is much different than the package of his US counterpart –not only the *content* of the package but also how this content is embedded in the social

context.

Now, imagine the high barrier that hampered the transfer of this technology –the high-yielding rice seed– form the US context –where it proved to work flawlessly– to the Malian context. The pre-existing knowledge at both sides of the barrier was very different due to the different socio-economic context, as are the (political) interests of both farmers. The technology nor the related knowledge could be transferred straightforwardly. Neither has the transfer reconfigured the socio-economic relations of Malian farmer according to the US model. The technology (the entire package) and the socio-economic relations of the Malian farmer are co-evolving in a new way, different from his traditional life but also different from the US agricultural model.

3 A genealogy of knowledge and technology in development

Other authors have sketched overviews of the role of knowledge (King and McGrath, 2004; Wilson, 2007; Cozzens et al., 2008) or Western science (Shah, 2009) in development discourses. They focused on specific subsets of the K&T ensemble. In this section I want to present a broader genealogy that goes further back in time.

The genealogy that is briefly summarised in this section is a general genealogy of the principal invocations and manipulations of K&T for the sake of development. It is not a historical account of a continuous evolution towards 'better practices'. Instead, this article is a genealogical account –in Nietzschean-Foucaultian sense– that pays attention to abrupt changes, parallel discourses, overturns in vocabulary, and the external forces at work in these changes. There is no clear *origin*, as Nietzsche would say (Foucault, 1991), but there can be traced an *emergence* and a *descent* of K&T in development. Or, as Derrida would say, the discourses have "always already" been there, and their roots can "always already" be discerned in the past (Derrida, 1978).

The genealogy of this section will be re-discussed in the fourth section of the article, where I will hold it against the light of epistemic and technological determinism.

Enlightenment The genealogy of 'knowledge in development' is closely related to that of the 'development' idea itself. At first sight 'development' seems a natural concept that is part of nature and human nature, and isomorphically applicable to societies and economies. Nothing, however, is further from the truth. Development in its social and economic sense —and in particular its linear, accumulative and unlimited character— is considered the brain child of a Western world view (Escobar, 1995; Rist, 1996).

> "That growth and progress can develop *ad infinitum*, this is an affirmation that radically distinguishes Western culture from all others" (Rist, 1996, p.389).

Yes, in the writings of Aristotle (384 BC - 322 BC) 'nature' equals 'development', since the word for nature $\varphi\upsilon\sigma\iota\varsigma$ derives from the verb $\varphi\upsilon\omega$, which means 'to grow' or 'to develop'. But it did not yet mean *infinite* growth. Aristotle saw

nature as cyclic, developing through the stages of birth, growth, decline and death, without ever reaching the perfect state.

Saint Augustine (354-430) introduced 'God' in natural history and linearised growth and development. Everything was believed to develop in a teleologic way according God's plan towards the inevitable end. Nothing was accepted any more to be cyclic –only Jesus Christ had resurrected.

Another legate of Augustine in the sciences was the conviction of the absolute wisdom of the Ancients. The famous aphorism "we are dwarfs perched on the shoulders of giants" was coined in the XXII century by Bernard of Chartres. It emphasised –in line with twelfth century thinking– the grandeur of the classical Greek and Roman authorities and the impossibility to go beyond the knowledge they had produced (Rist, 1996).

Only in the XVI and XVII century, with Bacon, Descartes and Pascal, this unsurpassable status of Ancient knowledge was challenged. Descartes wrote around 1628 that "we shouldn't give great credit to the Ancients on account of their antiquity [...] For the world is older now than it was then, and *we* have a greater experience of things" (Descartes, 4 74, p.204). Bernard Le Bovier de Fontenelle wrote that "a great, savage mind is, so to speak, composed by all great minds of all preceding centuries; [...] mankind will never degenerate and the sane voices of all the great minds that follow will always add one to another" (Fontanelle, 1688, my translation).

The old aphorism of the dwarf on the shoulders of the giant was recovered during Enlightenment, but acquired a new sense. It now paraphrased the supposed accumulative character of knowledge: all future generations can benefit from the body of knowledge that has been built up, and they can add their own little piece of knowledge to it. A decline of knowledge and science was believed to be impossible (Rist, 1996, p.62-70). According to Rist, this enlightened idea of the cumulative character or knowledge is in clear opposition to, on the one hand, the Ancients' aversion of infinity, and, on the other hand, the Augustinian faith in the inevitable end of the world.

The supposed accumulative character of knowledge and its beneficial effects were contested by only a minority of contemporary thinkers. Famous is the position of Rousseau who sustained in *Du contrat social* that "the progresses" are the results of our vices and our vain curiosity (Rousseau, 1750). His scepticism was shared by XVIII century philosophers David Hume and Adam Ferguson. Hume wrote that "when the arts and sciences come to perfection in any state, from that moment they naturally, or rather necessarily, decline, and seldom or never revive in that nation where they formerly flourished" (Hume, 1752, p.146).

Despite the dissident voices, what is left by the end of the eighteenth century is the hegemonic idea of uni-linear progress and infinite growth in our knowledge of the natural world. Not surprisingly, Merrit R. Smith (1994) argues that Enlightenment was also the cradle of the technological determinsm ideology. All streams of thought in the eighteenth and nineteenth century –the enthousiastic as well as the critical– held that technology and science are powerful agents of social change. So, if knowledge was believed accumulative, then also the complexity of technology would be accumulative, and so would be the sophistication of socio-economic organisation. According to Rist, the Enlightenment laid the basis for our contemporary idea that "the development of societies, of knowledge and of wealth corresponds with a natural, auto-dynamic principle" (Rist, 1996, p.69).

Now, I go a step further: the first enlightened voices that called to export European 'progresses' to the colonies, invoked precisely Europe's knowledge superiority as a pretext for the need to export the European 'progresses'. Condorcet, last of the *Encyclopédistes* –and a fervent critic of slavery– wrote in 1793 that:

> "The Europeans [...] will disseminate, in Africa and in Asia, the European principles and example of freedom, of the enlightened, and of reason. [...] [The colonies] are just waiting for our help to become civilised, and are waiting to find brothers among the Europeans, in order to become their friends and *pupils*."
> (Condorcet, Marquis de, 1793, p.316-7, translation and emphasis are mine).

Apparently the *teacher-pupil* relationship –with Europe in the role of the teacher– was already part of the progress ideology in the second half of the eighteenth century.

Stages in knowledge, stages in development The rise of social evolutionism in the nineteenth century moulded in an important way Western thinking concerning development. All societies of this planet were believed to pass through a number of stages of evolution, form savagery to civilisation. Moreover, the path was said to be universal, hence identical for all societies, and this created a unifying bond amongst all peoples. This also meant that, while savage tribes in the colonies were believed to led the life that our ancestors had led some millennia ago, evolution would inevitably transform their society in a society similar to the European.

The successive stages of social evolution were characterised by increasing complexity in social organisation, technology and knowledge. In this sense, social evolutionism added two meanings to K&T in development. First, August Comte argued that human thought "passes successively through three different theoretical conditions: the theological or fictitious; the metaphysical, or abstract; and the scientic, or positive" (Comte, 1830, p.71). As a consequence, the Western society was presented to have superior knowledge –*in an absolute manner*– with respect to non-European societies, since Europe was in the utmost advanced stage of evolution. Second, the type of K&T that a society possessed, such as its agricultural techniques, tools, technology, writing system,..., were a measure to determine the evolutionary stage in which the society found itself at that moment (e.g. Morgan, 1877).

By the nineteenth century Europe had already a long history as coloniser, but social evolutionism put colonialism into a new perspective. While for three centuries the main driver of Western expansion was the allurement of gold –and to a minor extent Christianisation– the wave of new colonisation at the end of the eighteenth century was explained by the need for larger markets for the expanding European industry (Arndt, 1987). Freedom of commerce was considered to be much more advantageous than a protective state control over commercial activities in the colonies. Social evolutionism was a helping hand in this new quest: it gave a philanthropic touch to new colonial expansion.

Characteristic is the 1885 Berlin Treaty that regulated the division of Africa among European countries – the so-called 'scramble for Africa'. At that time,

the French colonial doctrine was dictated by Jules Ferry, minister of external affairs, who sustained that "superior races have rights over inferior races, because they also have obligations towards them; they have the obligation to civilise the inferior races" (Ferry, 1885, translation is mine). Moreover, Ferry contended that the territories that wouldn't be colonised by France, would be colonised by other nations, probably "with less noble intentions".

Ferry's position was characteristic of his time, but it was also contested. A contemporary politician wondered "what kind of civilisation is it that we impose by cannon shot? Isn't it just another form of barbarianism? Don't these peoples of inferior race have equal rights as us?" (Ferry, 1885, translation is mine).

It needs to be underlined that the objective of civilising the 'inferior races' was, at that time, still completely detached from the idea of stimulating their economic development (Arndt, 1987). Economic development was still reserved to the European economies.

Social evolutionism was also reflected in the philosophy of the League of Nations, founded in 1919. The Covenant of the League of Nations is the first official document that mentions the concept 'development' and the idea that nations and peoples can 'develop' over time. Article 22 of the Covenant, that regulated the Mandatories of some member nations over others on behalf of the League, defended these Mandatories in terms of the different stages of development.

Technical Assistance for economic development President Harry Truman's famous speech of 1949 has been partly cited in the introduction of this article. The world remembers, above all, Point Four of the speech, in which he clearly stated that the developed peoples needed to help the underdeveloped ones. The scope: maintaining world peace. The means: the transfer of scientific knowledge and industrial technology. In his speech he clearly divided the world in a developed and an underdeveloped part (Escobar, 1995) – a division that was more glaring than the one in the Covenant of the League of Nations.

By proposing the transfer of scientific knowledge and industrial technology as cure for underdevelopment, Truman simply expressed the *zeitgeist*; he did not initiate a new movement. David Landes recalls the British groundnut scheme, implemented in Tanganyika over the period 1946-54, as "the mother" of all technology transfer projects (1998, p.501). The groundnut scheme had to show what the British government was capable of when it harnessed modern Western technology and expertise in their colonies. Although the peanuts were not destined for the African but for the British market, it was argued that the local farmers would learn from the large-scale industrialisation in agriculture and successfully copy it. The project turned into a blatant fiasco from every point of view , due to bad planning, a lack of local capacities, and adversary ecological conditions. After eight years, the project had even worsened the socio-economic situation of the local farmers (Havinden and Meredith, 1993, p.276-83).

The idea that Western K&T were the solution to generate progress and economic development was also at the basis of the conception of 'Technical Assistance' (TA) as instrument for development aid. Trough 1947 and 1948 the term TA was coined to indicate the help that was offered from the UN Economic Affairs Department to underdeveloped countries. In 1949, under impetus of Truman's Point Four, an Expanded Program of Technical Assistance was created, managed by the UN (for a complete history see Owen, 1959). It was es-

sentially a programme of unidirectional knowledge transfer, that was supposed to be apolitical. Local knowledge or traditions were mainly seen as obstacles, as expressed by the UN in 1951: "rapid economic progress is impossible without painful adjustments. Ancient philosophies have to be scrapped; old social institutions have to disintegrate" (UN, 1951, p.15, cited in Escobar, 1995, p.4).

As said earlier, Truman's idea to apply Western scientific knowledge and industrial technology in underdeveloped regions was not original. But he brought the *economic* meaning of 'development' to the front. The underdeveloped regions had to 'catch up' and develop their own capitalistic economy to the model of the developed West. Truman contended in his speech that more production equalled less poverty and more prosperity (Truman, 1949). This was confirmed by David Owen, the head of the UN Economic Affairs Department and later chairman of the Technical Assistance Board, who stated that "technical assistance [puts] into wide practice the concept of sharing economic skill and knowledge, [and this] gives every country the opportunity of being a partner in economic development" (Owen, 1959).

As a result, in the first two decades the focus of development assistance was exclusively on *economic* development. The TA programme of the UN and loans of the World Bank were aimed at giving 'the big push' and offering 'tech-fix' assistance, mostly in the form of large infrastructure and technology works, in an attempt to start weaving the network of economic activity. This development assistance was backed by a specific stream of economic thought: Rostow (1960), for instance, argued in an evolutionist élan that development passed through four "stages of economic growth", while Kuznets (1955) sustained that in an economically developing society the wealth gap between the poor and the rich automatically diminishes.

The absolute power of Western science and technology, and the conviction that this scientific knowledge was a global good, set the tone in 1963 at the first UN *Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas* in Geneva. The conference was taken as a scientific rather than a political meeting. Scientists and technical experts dominated the Geneva conference, 84% of them coming from the developed world (Standke, 2006).

Surprisingly, David Owen, chairman of the UN Technical Assistance Board and generally well aligned with Truman's visions, anticipated already in 1950 much of the criticism on TA that would start growing in the 1960s and 1970s. I quote him at length:

> "An economic mission from any one of the great industrial powers, no matter how benevolent the intentions, may [...] be met with charges [...] that its purpose is to bring the country under some form of *foreign economic domination*, that it is the instrument of foreign monopolists, and so on. [...]
> Moreover, even if the good intentions of the mission are fully appreciated, there remains the danger of a one-sided approach to the solution of the technical problems which the mission encounters. It is only natural that technical experts from any one country will be inclined to recommend a duplication of the institutions, organization, and techniques which have proved successful in their own country, though in many cases these solutions are *not necessarily compatible*

with the social and political structure of the recipient." (Owen, 1950, emphases are mine)

The Expanded Program of Technical Assistance merged in 1965 with the smaller Special Fund to form the still existing UNDP. The early concerns about TA, expressed by Owen (1950), continued to grow throughout the sixties. For instance, in 1968 Mathiasen wrote that although the number of development projects continued to grow, "persistent questions [were] raised about their effectiveness", especially questions related to the "sense that knowledge and ideas cannot be quickly –or usefully– transferred across cultural and scientific boundaries" (Mathiasen, 1968). These discussions, however, were still about how to improve the effectiveness of TA. They did not question the epistemological premises of the unidirectional transfer of K&T from the West to the underdeveloped world.

Technical Assistance for poverty alleviation A less economicist wind started to blow in the World Bank with the appointment of Robert McNamara to its leadership in 1968. Attention started to shift to equity concerns in development and to the needs of the very poor (Nolan, 2002). This is not surprising. Two decades of TA had not brought about convincing results. Moreover, criticism culminated in the late sixties and early seventies with the emergence of the Dependency School (e.g. Frank, 1969; Cardoso and Faletto, 1969, also mentioned in section 2), a group of critical scholars and policy-makers based in Latin America. They argued that the 'centre' of the world (the West) had developed at the expense of the 'periphery' (the ex-colonies), as if underdevelopment and development were communicating vessels, and that this unequal relation still persisted in development cooperation. The Dependency School criticised the technology transfer from the 'centre' to the 'periphery', since it created dependency.

The new wind in the late sixties provoked a clear shift in the types of projects and programs of the World Bank and UNDP. Although the agencies continued to finance large infrastructure to some extent, they started to be primarily concerned with rural development, poverty alleviation, job creation, and the reinforcement of local organisations. The development support from the North was now directed to grassroot development. The new paradigms of that time were 'integrated rural development' and 'community participation' in planning and implementation (Nolan, 2002).

Another expression of this attention to the poorest was the search for new forms of 'appropriate' or 'alternative' technologies, more adaptable to the local contexts in underdeveloped regions (Visvanathan, 2001). In the early 1970s, Schumacher (1973) elaborated on the idea of 'intermediate technologies' for development, which was initially used to indicated technologies that float somewhere between traditional village techniques and advanced capital intensive technologies of the Western world (Murphy et al., 2009). The term was soon replaced by 'appropriate technologies', indicating any technology that is small-scale, labour intensive rather than capital intensive, energy efcient, environmentally sustainable, and controlled and maintained by the local community of a developing region (Hazeltine and Bull, 1999; Murphy et al., 2009). The concept of appropriate technology and some sensibility for local knowledges were gradually adopted in World Bank models of technology transfer (Visvanathan,

2001), in order to improve the technology transfer. There were no attempts yet, within the development agencies, to question the ideology of technology transfer itself. Western science and technology continued to be seen as transferable to all corners of the planet.

It would be unfair to argue that before McNamara there was no attention at all for poor rural farmers. Already in the fourties the Rockefeller Foundation created in Mexico a research centre dedicated to develop high yielding wheat and maize varieties for the Mexican market (Ross, 2003). In 1963 the centre was given its current name *Centro Internacional para el Mejoramiento del Maiz y del Trigo* (CIMMYT). A similar centre for the improvement of rice (IRRI) was set up in the Philippines. The 'Green Revolution' started in those laboratories in the fourties and culminated in 1970 in a Nobel *Peace* Price for CIMMYT's principal researcher Norman Borlaugh. In 1971, under the impulse of the World Bank, these agricultural research centres were grouped under a new international, publicly funded, umbrella organisation: the Consultative Group on International Agricultural Research (CGIAR).

Although these initiatives show that there was already attention paid to the well-being of the rural populations, two remarks need to be made. First, this attention to the poorest –already present in Truman's speech and in the discourses of other development actors in the fourties– mostly stemmed from a concern about the rise of communism. Secure food production, they said, was essential to keep the poor rural populations in developing countries 'happy' and keep them away from communism. Second, in the 1940s, 50s and 60s the main scope of development aid was, without doubt, economic growth and the production of material goods. Along with economic growth, rural poverty would reduce. Only towards the end of the sixties, this relation was turned upside down and poverty reduction was put above economic growth.

Building Science and Technology Capacities in the South Since the late sixties, the world also witnessed the increasing bargaining power of the developing countries at the international political stage (Rist, 1996). The 'non-aligned' countries had adopted, at the 1970 Lusaka conference, the concept of 'collective self-reliance', while in 1974 the Group of 77 proposed a 'New International Economic Order' (NIEO) at the UN plenary. This power shift also reflected in international debates on science and technology for development, where the Group of 77 claimed more 'access' to science and technology.

I highlight, as example, the *World Plan of Action for the Application of Science and Technology for Development*, presented in 1971 by the UN Advisory Committee on Science and Technology for Development ACAST. The plan was clearly influenced by this new political climate and proposed three main targets (UN, 1971):

- developing countries should increase their domestic S&T output
- developed countries should intensify their aid to build up the science and technology capacities in developing countries
- a portion of the R&D in developed countries should be focused on the specific needs of developing countries

ACAST had commanded an introductory chapter for the World Plan to a group of experts at the University of Sussex. The chapter they wrote turned

out to be a radical piece of criticism to the application of science and technology in development aid. The document became known as the *Sussex Manifesto*. It was innovative in that it left behind all discourses about 'catch-up' or about the 'troubles with technology transfer'. Instead, the Sussex group sustained that the real problem was not about increasing production but about improving the *local capability* to produce [1]. The Sussex group highlighted the importance of how people, knowledge and environment interact to produce a particular state of development (Shah, 2009). Development "depends on people with outlook, knowledge, training and equipment to solve the problems posed by their own environment, and thus control their environment rather than be controlled by it" (Singer et al., 1970). The Sussex group called for changing the *organisation* of economical and scientific production *in developing countries themselves*.

The radical viewpoint of the Sussex Manifesto was relegated to the annexes of the World Plan (UN, 1971). It is noteworthy, however, that the radical Manifesto still argued for economic production as ultimate aspiration for the developing countries.

The UN organised a second *Conference on Science and Technology for Development* in Vienna in 1979. Contrary to the first one in Geneva, this conference was not on S&T at all, nor on appropriate technologies for developing countries. Instead, it was about the national politics of both developed and developing countries towards R&D institutions and technology transfers, as well as about the structure and role of the UN and transnational corporations (Standke, 2006). The conference was political, rather than scientific. The participants were governments, not scientists. Under pressure of the Group of 77 and their proposed NIEO, discussions were more about the 'equitable access' to science and technology and not about 'technology transfer'. Despite this shift in attention, discussions about 'equitable access' still adhered the mainstream philosophy that the application of science and technology would lead to development. Any critical voice questioning Western science and technology was kept out of the conference (Shah, 2009).

The role of S&T within the UN structure has followed cyclical patterns. Whereas the UN has made strong efforts during the 1960s, 1970s and 1980s to give the field of S&T a highly visible role in its deliberations, today the UN is no longer seen as a prime actor in this field (Standke, 2006). The World Trade Organisation, founded in 1995, has partly taken over the negotiations about access to technology and scientific knowledge.

The death of development aid The eighties and nineties witnessed the return of a neo-liberal ideology in development and a laudation of the beneficial forces of the free market. Policy-based lending and the infamous Structural Adjustment Programs were the instruments. Towards the turn of the millennium the market was abandoned again in favour of a stronger state and civil society. Poverty alleviation and the poor were back at the centre stage. Banners of this battle against poverty are the Poverty Reduction Strategy Papers and in the

[1] The Sussex Manifesto extensively wields the word 'capability', a concept that became notorious a decade later through the work of Amartya Sen (1985). This is not a surprise, since among the authors of the Manifesto are the founding members of the Science and Technology Policy Research Unit (SPRU), founded in 1966. This group developed the concept of 'capability'. In the Sussex Manifesto, however, the concept is used only to refer to science and technology capabilities.

Millennium Development Goals (established in 2000).

Together with this renewed attention to the poor, another, completely new tendency emerged: knowledge started to be given an *explicit* role in development, although many visions spawned on what that role exactly should be.

Developing the Knowledge Economy At the same time that the free market was abandoned as panacea for underdevelopment, there was a growing interest from scholars and development agencies to the role of knowledge as economic good (for a history of this emergence, see King and McGrath, 2002). New Growth Theory is grafted on classical Growth Theory, but extended with the observation that knowledge-based activities have increasing returns, while the returns in the physical economy diminish (Cortright, 2001). New Growth Theory's primary recommendation for developing countries is to bet on human capital and education, in order to generate growth from knowledge-related activities and creativity (Cozzens et al., 2008). This economic paradigm was adopted by the World Bank and is expressed, to some extent, in the 1998/1999 World Development report *Knowledge for Development*, from which I have quoted the first phrases in the introduction of this article (WORLD BANK, 1998). The philosophy of the Knowledge Economy is much more explicit in other World Bank publications (e.g WORLD BANK, 2001, 2007).

R&D and Innovation for Development Rooted in another strain of thought, but closely related to the Knowledge Economy paradigm, is the theory of Innovation Systems (Freeman, 1982; Edquist, 1997, amongst others). This theory inscribes the generation of science, technology, innovations, and development, into networks of actors and the relations among them: the innovation system. The three categories of actors that are usually discussed in innovation systems are: research institutions (both public laboratories and universities), governmental bodies and private enterprises (Edquist, 1997). Behind the concept lays an important shift about how technology is produced: the linear chain of invention–innovation–diffusion, has been replaced by a dynamic process of non-linear learning between multiple agents.

Development policies that adhere the Innovation System theory seek to identify and promote the political configurations and strategical investments that are needed to initiate or accelerate the process of innovation and technological development in the innovation system at stake.

Innovation Systems have the merit of having drawn the attention to the wider and plural milieu of knowledge production. Whereas TA was still primarily concerned with one-to-one knowledge transfer, Innovation Systems has made clear that the actual dynamic of knowledge production is many-to-many. Hall (2005), in examining biotechnology in developing countries, found that many Innovation Systems included not only research centres and the agro-business, but also pro-poor grassroot organisations, farmer associations and development actors. The challenge is to integrate this plurality of knowledge production and usage, characteristic of the reality in developing countries, into the Innovation Systems model and into TA (Wilson, 2007).

Knowledge Management When Wolfensohn was appointed president of the World Bank in 1996 he declared that the Bank had to become a 'Knowledge

Bank':

> We have been in the business of research and disseminating the lessons of development for a long time. But the revolution in information technology increased the potential vaule of these efforts by vastly extending their reach. [...] we need to [...] enhance our ability to gather development information and experience, and share it with our clients. We need to become, in effect, the Knowledge Bank." (Wolfensohn, 1996)

The 1998/1999 World Development Report was an immediate effect of this new line of thought in the World Bank. It puts together some ideas of 'Knowledge Economy' with that of 'Knowledge Management' and 'ICT for Development'.

In reference to Polanyi's (1966) distinction between tacit and explicit knowledge, Knowledge Management tries to convert the tacit knowledge of individual experts or employees of an organisation into explicit knowledge and manage it in a coprehensive way (Evers et al., 2009). The idea emerged in the 1990s in private companies that grew aware of the potential of new ICTs. King and McGrath (2004) distinguish two tendencies. The first or 'technological' approach is the one that tries to capture, store and distribute by means of ICT the knowledge that already exists among the experts in an organisation such as the World Bank. The second or 'social' approach focuses more on connecting people and putting them together in teams, in order to take advantage of their tacit knowledge.

Wolfensohn, by stating that the World Bank had to become a Knowledge Bank, clearly harnessed the technological approach in an aim to share the Bank's knowledge with the 'clients' through ICT. Assigning itself the role of knowledge broker, the World Bank adopted the ambitious goal of becoming the source of best practice and cutting-edge development knowledge. For this purpose, the World Bank created the Global Development Network. A web portal, the Global Development Gateway, collects all possible development-related knowledge, covering topics as varied as economics, AIDS, natural resources management, ... UNDP created a similar system, called SURF (Evers et al., 2009). Other development agencies have supported independent networks such as ELDIS or the Open Knowledge Network.

Much can be said about the confined character of the knowledge that is stored on such ICT network, or about the hegemony of Western experts' knowledge, or about the limited access from the Global South. For such criticism, I refer to Mehta (2001) and Evers et al. (2009).

ICT for Development As described above, the Knowledge Management credo places much hope in modern ICTs. However, since the 21st century is witnessing a digitalisation in all domains of life, from the economic over the social to the political, ICTs have been invoked for development in many different ways:

- The transfer of development-related knowledge, via the internet or satellite, "at virtually no cost" (WORLD BANK, 1998, p.130).
- ICT will bridge the digital divide between the 'information-rich' and the

'information-poor', in order to *instruct* the information-poor and *empower* their civil society.

- ICT as instrument or as economic good in the Knowledge Economy

The first has been discussed in the Knowledge Management section. The second and third usually constitute the 'ICT for Development' or 'ICT4D' discourse. The 2001 Human Development Report of UNDP, entitled *Making New Technologies Work for Human Development*, argued that ICT 'enables' development as follows. Technological innovation improves human capabilities –such as a healthy life, knowledge, creativity, and participation in the social, economic, and political life of a community– and hence has a beneficial impact on economic growth through general productivity gains. At the same time, improved human capabilities are crucial to produce technological innovation. Therefore, technological innovation and development are "mutually reinforcing, creating a virtuous circle" (UNDP, 2001, p.28).

So, in a certain sense the UNDP report confirms that technology and society co-evolve, as I have explained in section 2 of this article. Nevertheless, Avgerou (2003) notes that the UNDP report chooses to emphasise by large one side of the circle: that ICT innovation will generate the desired development. Thus, eventually, the report gives way to the deterministic view that 'technological advance' entails 'human development'.

The discussions on ICT4D are intense and ongoing. The hopes are high, but many projects fail. In fact, as is the case for any other technology, it has extensively been demonstrated that ICT adoption and innovation is a process that takes place within the formative conditions of a particular social and organizational context. The literature on ICT in developing countries has accumulated a substantial amount of empirical evidence, mainly case studies, that reveals the situated manner in which information systems projects take shape within the local communities that try to adopt it (Avgerou, 2003).

Capacity Building The Capacity Building [2] discourse explicitly opposes the technological determinism in TA and other practices of K&T transfer. From the 1950s through the 1970s TA had exclusively relied on the employment of Western experts, and its failure was no longer ignorable by the end of the eighties. Criticism to TA was now growing within the major development organisations themselves (for an overview, see Fukuda-Parr et al., 2002). A number of donor evaluations in the 1980s led to debates in the donor community.

The OECD-DAC issued in 1991 a document entitled Principles for New Orientations in Technical Co-operation, which called for changes in existing practices. A similar initiative was taken by UNDP, who performed a review, in collaboration with local governments, of TA in 30 African countries. This UNDP report (Berg and Seymour Whitaker, 1993) argued that TA had proven effective in getting the job done, but less effective at developing local institutions or building

[2]The concepts 'capacity' and 'capability' have much affinity but should not be confounded. The first roots in organisational and managerial sciences, as described by Kühl (2009), and is widely present in the current-day discourses of development agencies. The latter has a background in economics and is not present to the same extent in the discourses of development agencies. Amartya Sen's interpretation of 'capabilities' (1985), however, is implicitly at the basis of UNDP's Human Development Index.

local capacities. Actually, the contrary had happened: the old way of doing TA had heightened dependence on foreign experts, and distorted national priorities.

The concept 'capacity building' was picked up from this report by Edward V.K. Jaycox (1993), the then vice-president of the World Bank's Africa section. Berg and Jaycox's message was that TA had to rely much more on local expertise, rather than foreign experts. In this way, TA would stimulate and build up the local capacities.

The earlier cited UNDP publication of 2002 (Fukuda-Parr et al., 2002) was the real trigger for the spread of the Capacity Discourse in all development agencies. It completely rejected TA and proposed capacity building as the 'new solution to old problems'. The document explicitly recognises that knowledge is always embedded in a local context. Expert knowledge cannot replace local knowledge in order to generate development; the recipients need to open up towards new knowledge before it can be turned into endogenous knowledge. Therefore, development aid should harness local expertise. Ownership and partnership are, again, key words in capacity building.

> "Rather than starting from a mail-order catalogue of standard parts to be forced into likely looking slots, the challenge instead should be fully to understand the local situation and move forward from therestep by step. The major implication of this proposal is that it puts a high premium on local rather than international expertise." (Fukuda-Parr et al., 2002)

Fukuda-Parr et al. (2002) argues that capacity is distributed over three levels: the individual, the organisational, and the societal. With this, the capacity building concept recognises that building up the capacities at the level of the individual and the organisation is necessary but not sufficient. The agency of the individual or organisation to apply its capacities depends on the capacities of the society as a whole.

Kühl (2009) identifies a second line of descent for Capacity Building, situated in Organisational and Managerial Sciences. He argues that Capacity Building is the descendent of concepts like 'Institution Building' and 'Institutional Strengthening', which were already in vogue in the development debate in the sixties and seventies.

Since the nineties, the capacity building discourse has been picked up by all major development organisations and donors. Whereas Wolfensohn (1996) and the World Development Report (1998) had still fostered deterministic views on knowledge for development, an internal World Bank review in 2001 suggested that all the Bank's knowledge activities should be directed to enhancing the capacities of the clients (cited in King and McGrath, 2004, p.65-70).

After an euphemisation of the term from capacity *building* to capacity *development* (Kühl, 2009), the capacity discourse has gained a hegemonic status within development cooperation. A commitment to developing the capacities of beneficiaries is mandatory to get any medium or long term funding from any major donor agency (Kühl, 2009; Cherlet, 2011). Northern development NGOs are increasingly being screened by their donors to ascertain that they pay due attention to developing the capacities of the beneficiaries.

It is not surprising that the concept, which is on the lips of most development actors nowadays, has acquired multiple and often conflicting meanings [3] (Lipson

[3]The same is true for the concept 'capability'. The terms 'technological capability', as

and Hunt, 2008; Baser and Morgan, 2008; UNDP, 2010). Many views exist about which capacities should be developed and what for (for a comprehensive overview, see Baser and Morgan, 2008).

4 Discussion

The recent attention to K&T for development can be discussed from many different viewpoints: political, epistemological, organisational,.... In this section I will limit myself to, on the one hand, disentangling the many meanings of K&T for development, and, on the other hand, shedding some more light on technological and epistemic determinism as constant undercurrent in the genealogy.

Disentangling the different discourses Throughout history, since Enlightenment until today, K&T has been invoked for the sake of development in many different ways.

Enlightenment and Evolutionism highlighted knowledge, science and technology as *endogenous* characteristics of civilisation. Western scientific knowledge was the expression of the most advanced evolutionary stage a society could attain. From Condorcet, over the Berlin Treaty, to the League of Nations, they all invoked the superiority of Western knowledge and civilisation as motive to help civilising the 'inferior races'.

The role that Truman assigned to science and technology was radically different: he focused rather on the economic poverty of the underdeveloped world and harnessed Western science and technology as *exogenous* tool for the generation of economic growth. Industrial technology and large infrastructure would generate economic development. The (scientific) knowledge surrounding these Western technologies was embodied by the Western experts who were sent out for Technical Assistance. There was a heavy focus on the transfer of technologies but there were no particular efforts to foster knowledge production in the beneficiary society itself. Knowledge as endogenous factor of development seemed to be abandoned in favour of material production as endogenous motor of development.

Since the late 1990s, knowledge has again assumed an endogenous role in development, as can be deduced from the rise of the Knowledge Economy, Innovation Systems or Capacity Building discourses. Obviously, these discourses defend knowledge as endogenous in development for completely different reasons. Other recent discourses, like ICT4D, harness technology as an *instrument* in development rather than goal, and confirm that the focus is now on knowledge as endogenous factor in development. The central keyword of the last decade is 'knowledge', but it has been seized for very different goals: 'capacity building', 'empowerment', and 'economic growth'.

So, throughout history discussions about K&T for development once favoured technology, then knowledge, and vice versa. In one instance K&T were considered endogenous in development, in another instance they were exogenous tools

used by Singer et al. (1970), or 'social capability', coined by Abramovitz (1986), emphasise the need for scientific and technical education in order to generate *economic* growth. Amartya Sen's 'capability approach' has a much wider scope and is about the 'power' or 'freedom' of people to achieve *human* development (Sen, 1985, 1999).

that should be transferred to generate development. K&T have been called upon both as tool and as objective.

Moreover, when K&T have been invoked for development, this has been done with varying *aims*. In the pre-Truman era, it was invoked for the *civilisation* of the colonies. During the 1950s and 1960s it was invoked for *producing goods and economic growth*. In the 1970s the role of K&T was *alleviating poverty*. Nowadays, K&T is said to *empower* the people and to reinforce their capacities, while others see it as the motor in the *Knowledge Economy*.

It is important to emphasise that different discourses of K&T for development have existed along each other. Some of these discourses are mutually supportive while others defend completely opposite messages. This is especially true in the first decade of the twentieth century. When we scrutinise the credo 'Knowledge for Development', brought forward by the 1998/1999 World Development Report (WORLD BANK, 1998), we note that the flag covers a number of different cargoes. It includes elements of the Knowledge Economy, Innovation Systems, Knowledge Management and ICT4D paradigms. UNDP, from its side, also supports ICT4D and online Knowledge Management initiatives, but it is also a strong promoter of Capacity Building.

Finally, the genealogy of section 3 shows that at *any* point in history the reigning paradigm was always contested, to some minor or larger extent, from inside or outside the authoritative organisations.

Few has been said about *whose* K&T counts. All K&T discourses described above favour Western knowledge. Capacity Building, as an exception, tries to harness local expertise in order to build up local capacities, but still indigenous knowledge is largely ignored. Despite the increasing attention from scholars to indigenous knowledge, especially in natural resources management and conservation (e.g. Berkes et al., 2000; Dove, 2006; Berkes, 2009), this attention has not set roots yet in the major development agencies. The World Bank initiated a programme on *Indigenous Knowledge for Development* in 1998, but the last update of the programme's web portal dates from 2005 and the latest 'monthly' newsletter was published in January 2007 (WORLD BANK, 2010).

Epistemic and technological determinism I remind the reader that technological determinism ignores the intense co-evolution of technology and society, whereas epistemic determinism ignores that all knowledge is situated and embedded in its particular social context. Apart from the different roles that have been assigned to K&T in development, the degree of epistemic and technological determinism in the interpretations has also varied widely. Some discourses are particularly prone to epistemic and technological determinism, such as Technical Assistance, the ICT4D, Knowledge Management, and Knowledge Economy paradigm. That does not mean that they are imperatively deterministic. More and less deterministic views exist along each other.

The Capacity Building discourse explicitly opposes epistemic determinism; its raison d'être is the recognition that all knowledge is embedded in the local social context. Innovation Systems, too, emphasise that knowledge creation and learning happens through multi-actor interactions. But here again, the Capacity and Innovation Systems discourses have been invoked for such a variety of purposes that more and less deterministic versions co-exist.

In figures 2 and 3 I have sketched the rise and fall of the main discourses

on K&T in development[4]. Additionally, I have measured each discourse against two scales. The first scale (vertical scale in the grids of figures 2 and 3) measures the degree of technological/epistemic determinism:

1. K&T presented as completely independent from the social context (indicated as 'INDEP' in figures 2 and 3)
2. K&T presented as independent from social context, but some adaptation to the local context will favour their success
3. K&T presented as embedded in the social context, but the discourse still relies on the idea that one party learns from the other
4. K&T presented as completely embedded in the social context; any transfer is very problematic as learning or innovation must happen within the social context (indicated as 'EMB' in figures 2 and 3).

The scale focuses on only one of the two underlying ideas of technological and epistemic determinism: the one that undergirds the conviction that K&T can be transferred.

The second scale (the horizontal scale in the grids of figures 2 and 3) evaluates the aim for which K&T are invoked; it measures the degree of 'economic determinism' in the discourse:

1. K&T exclusively invoked for social development, or for the empowerment of the people (indicated as 'SOC' in figures 2 and 3)
2. K&T invoked for social development; the social development will also lead to a more productive society
3. K&T invoked for economic development; this economic development will also lead to social development
4. K&T exclusively invoked for economic development (indicated as 'ECON' in figures 2 and 3).

Beyond capacity building Wilson (2007) remarks that old-style Technical Assistance as well as the more progressive Capacity Building focus on "learning things that are already known by one of the actors". Therefore, he distinguishes 'learning from' and 'learning with'. The former still reigns development aid, while instead it should focus more on the latter. 'Learning with' is inspired by Habermas's 'ideal speech situation', where different knowledges are equally valued as possible source of creative learning and new knowledge production (Wilson, 2007). 'Learning with' would be a mode of cooperation that fully transcends epistemic determinism.

[4]All timelines in figures 2 and 3 are retrieved from the Google Books database (Michel et al., 2011). The timeline of 'Capacity Building', for instance, shows for each year from 1940 until 2005 the relative occurrence of the 2-gram 'Capacity Building' among all possible 2-grams in the books published in that particular year. Different spellings of the n-grams were taken into account. The graphs have been smoothed by floating ± 1 averages and splines. The timelines are included in this article to show *tendencies*, not absolute values. The author judged that the four n-grams of figure 2 have very precise meanings and can be confronted in one single graph. The n-grams of figure 3 have broad meanings and it is senseless to compare their timelines.

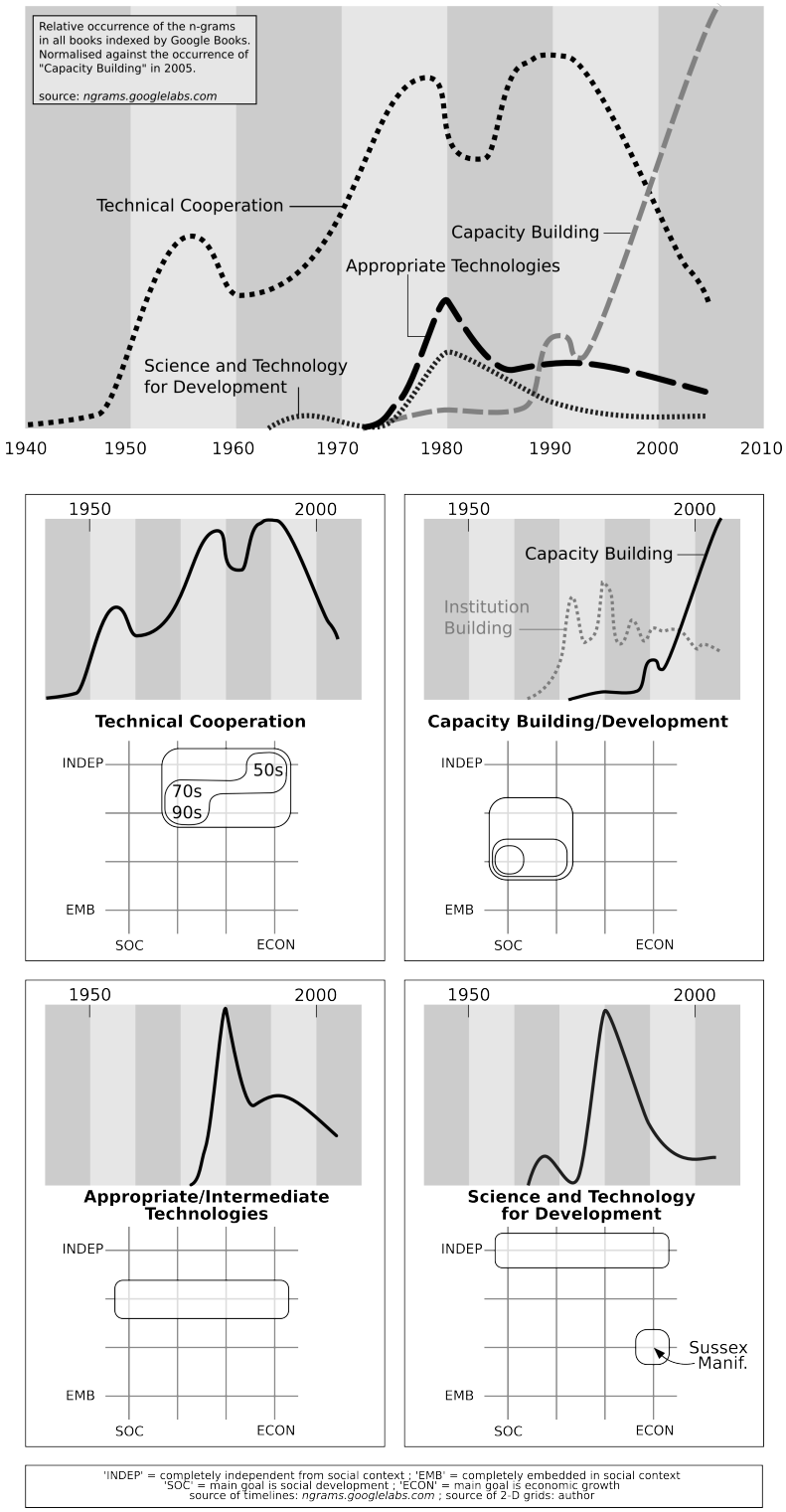

Figure 2: The rise and fall of K&T discourses, and their characteristics.

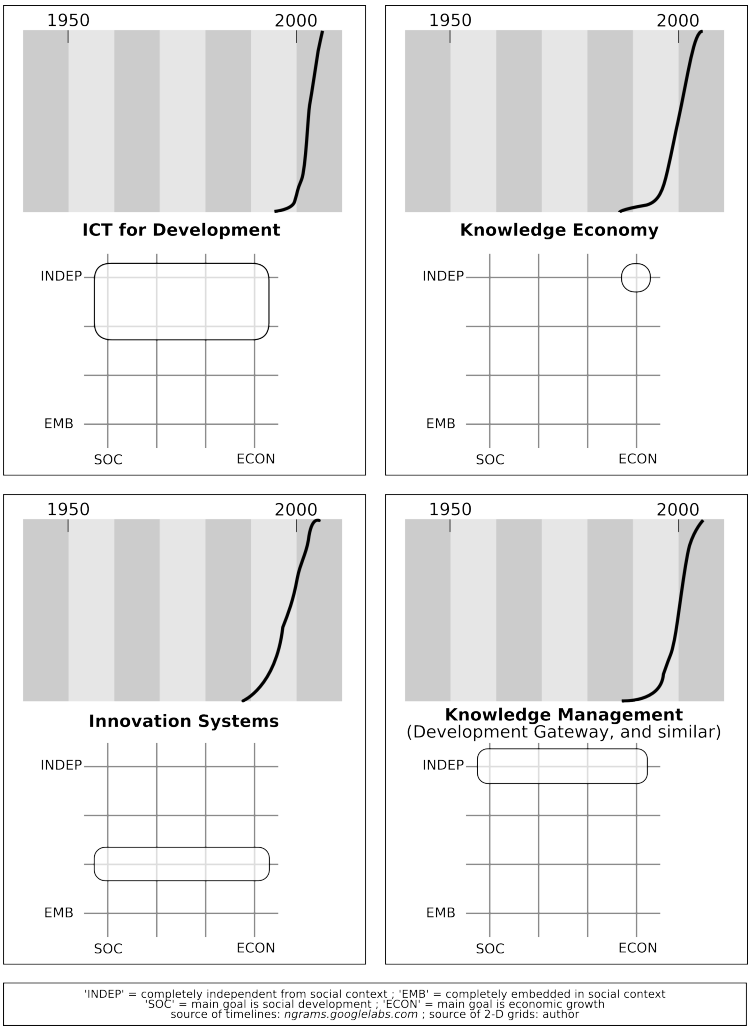

Figure 3: The rise and fall of K&T discourses, and their characteristics.

That most development agencies have embraced Capacity Building, demonstrates that there is a growing sensibility to the 'situatedness' of knowledge and technology. Nonetheless, very deterministic discourses on K&T continue to persist. Denning noticed an apparent contradiction:

> "Ironically, at the very moment that it becomes technologically possible to move information instantaneously around the world, comes the recognition that the context in which knowledge arose is often crucial to understanding or exploiting it. Knowledge without context is not knowledge at all." (Denning, 2001)

5 Conclusion

In the last chapter of their book, King and McGrath wondered whether knowledge based aid was just a passing fashion just like so many other brandwagon concepts in development aid (2004, p.196-7). They were convinced that it would probably start losing importance when Wolfensohn's reign would end in 2005. By now Wolfensohn has left office, but knowledge is still at the core of the development agenda. And this is exactly what I have tried to demonstrate in my genealogy: that K&T, two very intimately linked concepts, have always been at the core of development discourses. The question is: will Wolfensohn's *interpretation* of the role of knowledge last? The answer will probably be "no", it won't last.

The genealogy that was sketched in section 3 has shown that the invocation of K&T in development discourses has an age-long descent. The idea of 'knowledge for development' emerged during Enlightenment, when the development idea itself emerged. Since then, many different roles have been allotted to K&T in development aid, once exogenous in the development concept, then endogenous, and vice versa. The purpose for their invocation, too, has varied widely: for civilising the 'inferior races', for economic development, for poverty alleviation, for empowerment, capacities or freedom.

Two important things should be learned from the genealogy. First, that each of the discourses emerges from a different intellectual and political background, includes certain values, and conveys specific views on the organisation of social and economic life. In sum, none of these discourses is neutral. Any one of these discourses, when invoked by development practitioners, invests their professional interventions with legitimacy and steers the beneficiaries towards specific world views of agency over the knowledge or the technology.

Second, the development practitioners and the beneficiaries should be aware of the epistemic and technological determinism that easily sneaks into 'K&T for development' discourses. As Wyatt (2008) and Bijker (2010) remind us, not only are epistemic and technological determinism false, the are also "politically debilitating" and even "dangerous". In fact, they unjustly wrests from society its agency and control over the development of technology and it absolves society from any responsibility to account for certain technological developments. For instance, when a genetically improved crop seed is imported in a developing country and presented as a saviour of hunger, it dispenses the local government from its responsibility to guarantee fair food policies or stable food markets. It also deprives the population of control over the development of the technology and its possible side-effects.

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